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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/681,821	06/11/2001	Ji-Cheng Zhao	RD-26970	6874

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EXAMINER

MCNEIL, JENNIFER C

ART UNIT	PAPER NUMBER
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1775

DATE MAILED: 02/26/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/681,821	ZHAO ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Jennifer McNeil	1775	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 February 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-40 and 48-52 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4,5,10,11,16-19,21-40 and 48-52 is/are rejected.
- 7) ☒ Claim(s) 3,6-9,12-15,20 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                  | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other:  |

**DETAILED ACTION*****Election/Restrictions***

Applicant's election with traverse of Group I in Paper No. 5 is acknowledged. The traversal is on the ground(s) that the subject matter is not distinct and a burden is not excessive. This is not found persuasive because . This is not found persuasive because the provisionally elected Group I article claims do not contain the process limitations recited in the non-elected Group II claims. Using a casting process does not require a disposing of a diffusion layer onto the substrate, rather the substrate is disposed on the coating and then removed from the mold. Therefore, a complete search of the elected claims need not cover the subject matter in the non-elected claims. Additionally, MPEP 803 states that there are two criteria for restriction between patentably distinct inventions: (A) The inventions must be independent (see MPEP § 802.01, § 806.04, § 808.01) or distinct as claimed (see MPEP § 806.05 - § 806.05(I)); and (B) There must be a serious burden on the examiner if restriction is required (see MPEP § 803.02, § 806.04(a) - § 806.04(I), § 808.01(a), and § 808.02). MPEP further states that for purposes of the initial requirement, a serious burden on the examiner may be prima facie shown if the examiner shows by appropriate explanation either separate classification, separate status in the art, or a different field of search as defined in MPEP § 808.02.

Rejoinder of these claims will be revisited upon allowance of the article claims, and if the method claims are commensurate with the allowed article claims.

The requirement is still deemed proper and is therefore made FINAL.

***Claim Objections***

Claim 17 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in

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independent form. Claim 17 limits the aluminum content to 1-15 at%. Claim 17 is ultimately dependent from new claim 49, which limits the aluminum content to 1-15 at%.

*Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 16, 17, and 52 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 16 adds the limitation of 1-35 at% Al to the composition. Claim 16 not depends ultimately from new claim 49, which limits the aluminum content to 1-15 at%. This range is inconsistent. Also, claim 17 depends from claim 16 and limits the aluminum content to 1-15 at%. For the purposes of examination, claims 16 and 17 are interpreted as not further limiting independent claim 49.

Claim 52 has two groupings (b and d) that include ruthenium. May ruthenium be present twice such that the composition only has three elements, or should there be four different elements present?

*Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 4, 10, 11, 18, 19, 48, 50 and 51 are rejected under 35 U.S.C. 102(b) as being anticipated by Schutz et al (US 4,915,733). Schutz teaches metal composite powders comprising more than 70 wt% rhenium or tungsten, and a binder metal one or more of chromium, iron, cobalt, and nickel (col. 2, lines

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14-23). Upon conversion, a composite powder with 70 wt% Re and 30 wt% Cr converts to 39.4 at% Re and 60.5 at% Cr. For tungsten, a composite of 80 wt% W and 20 wt% Cr converts to 53 at% W and 46.9 at% Cr. Also, a composition of 70 wt% Re, 15 wt% Cr, and 15 wt% Ni converts to 40.8 at% Re, 31.4 at% Cr, and 27.8 at% Ni. The instant claims refer to a "barrier coating material". This is considered intended use and the claims are considered a material.

Claim 50 is rejected under 35 U.S.C. 102(b) as being anticipated by Fischbein et al (US 3,829,969). Fischbein teaches a protective layer of an alloy of a first metal selected from a group including rhenium and ruthenium, and a second metal selected from a group including chromium. An example in the table of columns 9-10 includes 71 at% Cr and 29 at% Ru.

Claims 5, 48, 50, 51, and 52 are rejected under 35 U.S.C. 102(b) as being anticipated by Czech et al (US 5,273,712). Czech teaches a corrosion resistant protective coating including 1-20 wt% Re, 15-50 wt% Cr, 0-15 wt% Al, and 0-12 wt% W. These ranges are considered overlapping with the instant claims. For example, 20 wt% Re, 12 wt% W, 40 wt% Cr, and 28 wt% Ni converts to 7.6 at% Re, 4.6 at% W, 54.2 at% Cr, and 33.6 at% Ni. Regarding claim 50, the inclusion of nickel in the composition of Czech is considered a binder and does not alter the general composition. Regarding claim 52, the instant claims require a small amount of a fourth element, and this range is also considered to overlap with the ranges taught by Czech.

Regarding claim 5, a composition of 18 wt% Re, 12 wt% W, 20 wt% Ni, and 50 wt% Cr converts to 6.6 at% Re, 4.5 at% W, 23 at% Ni, and 65 wt% Cr. The tungsten at 4.5 at% is considered "about" 5 at%.

Claims 21-26, 28, 29, 37, and 39 are rejected under 35 U.S.C. 102(b) as being anticipated by Jackson (US 4,980,244). Jackson teaches a protective alloy coating for use in jet engine parts. The coating comprises 35 at% Cr, 19.8 at% Ru, 15 at% Fe, 30 at% Al, and 0.2 at% Y, as shown in Table IV.

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Regarding claim 28, the above composition is commensurate with that of the instant claims and is therefore fully expected to possess the same characteristics. Regarding claim 37, and alumina layer is formed over the protective coating (col. 8, lines 14-32).

Claims 48, 50, and 51 are rejected under 35 U.S.C. 102(b) as being anticipated by Kapoor (SIR H1146). Kapoor teaches a tungsten heavy alloy comprising 80-100 wt% tungsten and 0-20 wt% of an element selected from a group including chromium. This alloy may then be combined in a 90/10 ratio with an element selected from a group including iron, nickel, cobalt or tantalum. These ranges overlap with the ranges of the instant claims. For instance, 80 wt% W and 20 wt% Cr convert to 53 at% W and 46 at% Cr. Further combining this with iron, nickel, or cobalt, will give a composition with ranges overlapping the instant ranges.

Claim 49 is rejected under 35 U.S.C. 102(b) as being anticipated by Prasad (US 4,459,263). Prasad teaches an alloy comprising 40-60 wt% Co, 20-30 wt% Cr, 5-15 wt% Ru, and 1-4 wt% Al. This overlaps with the instant ranges. For instance, a composition of 51 wt% Co, 4 wt% Al, 15 wt% Ru, and 30 wt% Cr converts to 49.7 at% Cr, 8.5 at% Al, 8.5 at% Ru, and 33.1 at% Co.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 35 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jackson (US 4,980,244). Jackson et al teach a protective coating as discussed above but do not specifically teach the thickness of the coating. Absent a showing of unexpected results, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use a thickness that would give the

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desired effect of protection of the substrate from environmental attack, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art (*In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980)).

Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jackson (US 4,980,244) in view of Cybulsky et al (US 6,168,875). Jackson teaches a protective coating for use in turbine engines but does not teach an additional ceramic applied over the alumina layer. Cybulsky et al teach a typical turbine engine coating including a bond coat, an additional protective layer including rhenium, and a final thermal barrier layer of stabilized zirconia. The zirconia coating is well-known in the art as a protective coating over the metallic overlayers and provides additional protection to the component. It would have been obvious to one of ordinary skill in the art to apply the zirconia thermal barrier layer of Cybulsky to the turbine component of Jackson to provide additional protection from the harsh environment of turbine engines.

Claims 21-28, 35-37, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Czech et al (5,273,712) in view of Cybulsky et al (US 6,168,875). Czech teaches a corrosion resistant protective coating including 1-20 wt% Re, 15-50 wt% Cr, 0-15 wt% Al, and 0-12 wt% W, and other optional elements as discussed above. Czech et al do not teach a further overcoat for the protective coating. Cybulsky et al teach a typical turbine engine coating including a bond coat, an additional protective layer including rhenium, and a final thermal barrier layer of stabilized zirconia. The zirconia coating is well-known in the art as a protective coating over the metallic overlayers and provides additional protection to the component. It would have been obvious to one of ordinary skill in the art to apply the zirconia thermal barrier layer of Cybulsky to the turbine component of Czech to provide additional protection from the harsh environment of turbine engines.

Regarding claims 35 and 36, absent a showing of unexpected results, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use a thickness that would give the desired effect of protection of the substrate from environmental attack, since it has been held

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that discovering an optimum value of a result effective variable involves only routine skill in the art (*In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980)).

Claims 21-37, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Czech et al (US 5,154,885) in view of Leverant et al (US 6,143,141). Czech et al teach a corrosion resistant protective coating as discussed above, but do not include an additional layer of metallic material, or a ceramic thermal barrier. Leverant teach superalloy substrates with a rhenium containing diffusion barrier layer, a MCrAlY layer over the diffusion layer, and an alumina layer over the MCrAlY layer. Leverant teaches the additional aluminide layer for additional protection. It would have been obvious to one of ordinary skill in the art to apply the aluminide layer of Leverant to the turbine component of Czech to provide additional diffusion protection from the harsh environment of turbine engines.

Claim 38, and 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Czech et al (US 5,154,885) in view of Leverant et al (US 6,143,141), and further in view of Cybulsky et al (US 6,168,875). Czech et al teach a corrosion resistant protective coating as discussed above, but do not include an additional layer of metallic material, or a ceramic thermal barrier. Leverant teach superalloy substrates with a rhenium containing diffusion barrier layer, a MCrAlY layer over the diffusion layer, and an alumina layer over the MCrAlY layer. Cybulsky et al teach a typical turbine engine coating including a bond coat, an additional protective layer including rhenium, and a final thermal barrier layer of stabilized zirconia. The zirconia coating is well-known in the art as a protective coating over the metallic overlayers and provides additional protection to the component. It would have been obvious to one of ordinary skill in the art to apply the zirconia thermal barrier layer of Cybulsky to the turbine component of Czech as modified with Leverant to provide additional protection from the harsh environment of turbine engines.



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*Allowable Subject Matter*

Claims 3, 6-9, 12-15, and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

*Response to Arguments*

The 37 CFR 1.131 Declaration submitted by applicant December 9, 2002 (executed copy received February 12, 2003), obviates the rejections with Spitsberg '524.

The examiner appreciated the conversion done by applicant. However, the higher and lower level conversion of the elements does not take into consideration other elements that may be present in the layer. The claims are not directed to a layer "consisting" of these elements, and therefore it must be considered that other elements may be present. For each rejection above, a conversion is provided for at least one example. These conversions were done with most of the elements that are provided in each respective layer, and it is the examiner's position that these conversions clearly show overlap with applicant's ranges.

While performing the conversions, it was found that Czech '712 and Jackson '244 apply to additional claims.

Applicant's arguments with regard to these references primarily address the conversions. As stated above, these conversions do not account for other materials that may be present, and which would affect the range of the atomic percent.

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*Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer McNeil whose telephone number is 703-305-0553. The examiner can normally be reached on Monday through Friday, 9:30AM-6:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah Jones can be reached on 703-308-3822. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Jennifer McNeil  
Examiner  
Art Unit 1775



JCM  
February 23, 2003

  
DEBORAH JONES

SUPERVISORY PATENT EXAMINER